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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,385	07/25/2003	Santosh S. Rao	VRT0089US	3916

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EXAMINER	
WASEL, MOHAMED A	
ART UNIT	**PAPER NUMBER**
2154	

DATE MAILED: 01/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/627,385	RAO ET AL.	
	Examiner	Art Unit	
	Mohamed Wasel	2154	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *17 November 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This action is responsive to Amendment filed on November 17, 2005.

Claim 6 has been amended.

Claims 1 -31 are presented for examination.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 1-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Frank et al ,(Frank) U.S. Patent No. 6,532,494.

1. As per claim 1, Frank teaches a method comprising:

a) providing a coordinator virtual device corresponding to at least a portion of a physical data storage device (***abstract, col. 1 lines 30-40, col. 3 lines 34-45***);

b) detecting when a computer system cluster, including a plurality of nodes, is partitioned (***col.9 lines 51-61, col. 2 lines 5-15***);

c) attempting to gain control of the coordinator virtual device (***col. 3 lines 35-45, col. 5 lines 7-60, col. 8 lines 43-48; each node sends a heartbeat message to other nodes to identify its status***); and

d) removing at least one of the plurality of nodes from the computer system cluster when the attempting is unsuccessful (***col. 5 lines 7-60, col. 10 lines 10-15; if a node fails to receive a heartbeat message, then cluster enters a reconfiguration mode to remove unresponsive node from cluster***).

2. As per claim 2, Frank teaches the method wherein the providing a coordinator virtual device corresponding to at least a portion of a physical data storage device further comprises:

a) selecting the at least a portion of a physical data storage device (***col. 3 lines 1-20***);

b) associating a physical description of the at least a portion of a physical data storage device with a coordinator virtual device identifier (***col. 3 lines 35-45, col. 6 lines 34-40***); and

c) allowing at least one of the plurality of nodes of the computer cluster to access the at least a portion of a physical data storage device via the coordinator virtual device identifier (***col. 3 lines 35-45, col. 6 lines 34-40***).

3. As per claim 3, Frank teaches the method wherein the providing a coordinator virtual device corresponding to at least a portion of a physical data storage device is performed by at least one virtual device configuration server (***col. 3 lines 1-20, col. 4 lines 32-43***).

4. As per claim 4, Frank teaches the method wherein the at least one virtual device configuration server is separate from the plurality of nodes of the computer cluster and wherein at least one of the plurality of nodes of the computer cluster further comprises a virtual device configuration client (***col. 4 lines 7-35***).

5. As per claim 5, Frank teaches the method further comprising:

reading cluster membership information from the coordinator virtual device corresponding to at least a portion of a physical data storage device (***col. 2 lines 61-62, Fig. 6 element 88***).

6. As per claim 6, Frank teaches the method wherein the detecting when a computer system cluster, including a plurality of nodes, is partitioned (***col. 9 lines 51-62***) further comprising:

a) reading, as performed by one of the plurality of nodes, cluster membership information from the coordinator virtual device corresponding to at least a portion of a physical data storage device (***col. 2 lines 61-62, Fig. 6 element 88***); and

b) determining whether the cluster membership information indicates that the one of the plurality of nodes is a current member of the computer system cluster (***col. 3 lines 66-67, col. 4 lines 1-6, col. 5 lines 1-5***).

7. As per claim 7, Frank teaches the method further comprising:

writing cluster membership information to the coordinator virtual device corresponding to at least a portion of a physical data storage device (***col. 6 lines 14-28***).

8. As per claim 8, Frank teaches the method of wherein the coordinator virtual device corresponding to at least a portion of a physical data storage device further comprises cluster membership information (***col. 3 lines 37-57***).

9. As per claim 9, Frank teaches the method wherein the coordinator virtual device corresponding to at least a portion of a physical data storage device is a coordinator volume (***Fig. 1 element 22, col. 3 lines 1-10***).

10. As per claim 10, Frank teaches the method wherein the detecting when a computer system cluster, including a plurality of nodes, is partitioned further comprises:

a) monitoring a network coupled to each of the plurality of nodes for a heartbeat signal (***col. 4 lines 24-34, col. 6 lines 6-23***); and

b) determining when the heartbeat signal is not present for a specified period of time (***col. 2 lines 5-34, col. 5 lines 18-23***).

11. As per claim 11, Frank teaches the method further comprising:

retaining the at least one of the plurality of nodes in the computer system cluster when the attempting is successful (***col. 8 lines 48-55***).

12. As per claim 12, Frank teaches the method encoded in a computer readable medium as instructions executable on a processor, the computer readable medium being one of an electronic storage medium, a magnetic storage medium, an optical storage medium, and a

communications medium conveying signals encoding the instructions (***col. 10 lines 62-67, col. 11 lines 1-4***).

13. As per claim 13, Frank teaches the method further comprising:

allowing at least one of the plurality of nodes of the computer cluster to exclusively access the at least a portion of a physical data storage device (***col. 3 lines 6-44***).

14. As per claim 14, Frank teaches the method further comprising:

obtaining exclusive access to the at least a portion of a physical data storage device (***col. 3 lines 6-44***).

15. As per claim 15, Frank teaches a system comprising:

a) a first data storage device (***abstract, col.1 lines 30-40, col. 3 lines 34-45***);

b) a virtual device configuration server coupled to the first storage device and including a first memory and a first processor configured to provide a coordinator virtual device corresponding to at least a portion of the first data storage device (***Fig. 5; col. 7 line 54 to col. 8 line 150; storage device, memory and processor are inherent because they are a major hardware components of a basic computer system***);

c) a plurality of virtual device configuration clients configured as a computer system cluster, at least one of the plurality of virtual device configuration clients including a second memory and a second processor (***col. 1 lines 30-40***) configured to:

c1) detect when the computer system cluster is partitioned (***col.9 lines 51-61, col. 2 lines 5-15***);

c2) attempt to gain control of the coordinator virtual device corresponding to at least a portion of the first data storage device (***col. 3 lines 35-45, col. 5 lines 7-60, col. 8 lines 43-48; each node sends a heartbeat message to other nodes to identify its status***); and

c3) remove the at least one of the plurality of virtual device configuration clients from the computer system cluster when the attempt to gain control of the coordinator virtual device is unsuccessful (***col. 5 lines 7-60, col. 10 lines 10-15; if a node fails to receive a heartbeat message, then cluster enters a reconfiguration mode to remove unresponsive node from cluster***).

16. As per claim 16, Frank teaches the system wherein virtual device configuration server is further configured to:

a) select the at least a portion of the first data storage device (***col. 3 lines 1-20***);

b) store a coordinator virtual device identifier associated with a physical description of the at least a portion of the first data storage device (***col. 3 lines 35-45, col. 6 lines 34-40***); and

c) allow the at least one of the plurality of virtual device configuration clients to access the at least a portion of the first data storage device via the coordinator virtual device identifier (***col. 3 lines 35-45, col. 6 lines 34-40***).

17. As per claim 17, Frank teaches the first data storage device is at least one of a disk drive, a JBOD, a disk array, and an integrated circuit (***col. 10 lines 64-67***).

18. As per claim 18, Frank teaches the system wherein the first data storage device is coupled to the virtual device configuration server via a network (***col. 11 lines 5-10***).

19. As per claim 19, Frank teaches the system wherein the virtual device configuration server is a volume server, wherein the coordinator virtual device is a coordinator volume, and the plurality of virtual device configuration clients is a plurality of volume clients (***Fig. 1 element 22, col. 3 lines 1-10***).

20. As per claim 20, Frank teaches the system wherein the at least one of the plurality of virtual device configuration clients is further configured to read cluster membership information from the coordinator virtual device corresponding to at least a portion of the first data storage device (***col. 2 lines 61-62, Fig. 6 element 88***).

21. As per claim 21, Frank teaches the system of claim 20 wherein the at least one of the plurality of virtual device configuration clients is further configured to determine whether the cluster membership information indicates that the at least one of the plurality of virtual device configuration clients is a current member of the computer system cluster (***col. 3 lines 66-67, col. 4 lines 1-6, col. 5 lines 1-5***).

22. As per claim 22, Frank teaches the system wherein the at least one of the plurality of virtual device configuration clients is further configured to write cluster membership information to the

coordinator virtual device corresponding to at least a portion of the first data storage device (***col. 6 lines 14-28***).

23. As per claim 23, Frank teaches the system wherein the coordinator virtual device corresponding to at least a portion of the first data storage device further comprises cluster membership information (***col. 3 lines 37-57***).

24. As per claim 24, Frank teaches the system wherein the at least one of the plurality of virtual device configuration clients is further configured to retain the at least one of the plurality of virtual device configuration clients in the computer system cluster when the attempt to gain control of the coordinator virtual device is successful (***col. 8 lines 48-55***).

25. As per claim 25, Frank teaches the system wherein the first memory and the virtual device configuration server belong to at least one of a host computer system, a cluster node, a storage appliance, a network appliance, and a storage area network (SAN) switch (***Fig. 4 element 16, col. 1 lines 30-40, col. 3 lines 34-45, col. 11 lines 5-10***).

26. As per claim 26, Frank teaches the system wherein the at least one of the plurality of virtual device configuration clients is further configured to obtain exclusive access to the coordinator virtual device (***col. 3 lines 6-44***).

27. As per claim 27, Frank teaches the system wherein the virtual device configuration server is further configured to allow exclusive access to the coordinator virtual device by the at least one of the plurality of virtual device configuration clients (***col. 3 lines 6-44***).

28. As per claim 28, Frank teaches an apparatus comprising:

a) a means for providing a coordinator virtual device corresponding to at least a portion of a physical data storage device (***abstract, col.1 lines 30-40, col. 3 lines 34-45***);

b) a means detecting when a computer system cluster, including a plurality of nodes, is partitioned (***col.9 lines 51-61, col. 2 lines 5-15***);

c) a means for attempting to gain control of the coordinator virtual device (***col. 3 lines 35-45, col. 5 lines 7-60, col. 8 lines 43-48; each node sends a heartbeat message to other nodes to identify its status***); and

d) a means for removing at least one of the plurality of nodes from the computer system cluster when the attempting is unsuccessful (***col. 5 lines 7-60, col. 10 lines 10-15; if a node fails to receive a heartbeat message, then cluster enters a reconfiguration mode to remove unresponsive node from cluster***).

29. As per claim 29, Frank teaches the apparatus further comprising:

a means for reading cluster membership information from the coordinator virtual device corresponding to at least a portion of a physical data storage device (***col. 2 lines 61-62, Fig. 6 element 88***).

30. As per claim 30, Frank teaches the apparatus of claim 28 further comprising:

a means for writing cluster membership information to the coordinator virtual device corresponding to at least a portion of a physical data storage device (***col. 6 lines 14-28***).

31. As per claim 31, Frank teaches the apparatus of claim 28 further comprising:

a means for determining whether cluster membership information stored in the coordinator virtual device corresponding to at least a portion of a physical data storage device indicates that the one of the plurality of nodes is a current member of the computer system cluster (***col. 3 lines 66-67, col. 4 lines 1-6, col. 5 lines 1-5***).

Response to Arguments

1. Applicant's arguments filed on November 17, 2005 have been fully considered but they are not persuasive. Therefore, rejection of claims 1-31 is maintained.

- In the remarks, the Applicant argues in substance that:
  a. A request to withdraw 35 U.S.C. 101 rejection.
  b. Frank does not teach a *coordinator virtual device* and further Frank does not teach attempting to gain control of the coordinator virtual device and removing a node from a computer cluster upon unsuccessful attempt to join.
  c. Frank does not teach *virtual device configuration server*.
- In response to argument:

a. Applicant's arguments with regard to the 35 U.S.C. 101 rejection made in the last Office Action mailed on December 9, 2005 have been fully considered and are persuasive; therefore, the 35 U.S.C. 101 rejection is hereby withdrawn.

b. Examiner respectfully disagrees. Frank shows the use of a cluster manager, herein interpreted as a coordinator virtual device that oversees the removal and addition of nodes while considering whether or not the attempt to gain control of the coordinator virtual device is successful. More specifically, Frank shows the use of making it a requirement to have access to the sharable storage devices (***col. 3 lines 35-45***). After joining, if the node can no longer access the sharable storage it is removed from the cluster (***col. 10 lines 10-15***). Therefore, Frank meets the scope of the claimed limitation.

c. In regard to *virtual device configuration server*, Applicant's attention is directed to (***Fig. 5; col. 7 line 54 to col. 8 line 15***) of Frank for support to Applicant's claimed subject matter.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR

1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mohamed Wasel whose telephone number is (571) 272-2669. The examiner can normally be reached on Mon-Fri (8:00 am - 4:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Follansbee can be reached on (571) 272-3964. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MW

January 17, 2005

JOHN FOLLANSBEE
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